

# Multimodal physiotherapy program in treatment of post-operative femoral condylar stiffness: A case report

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## ABSTRACT

Post traumatic restricted range of motion in knee joint is termed as knee stiffness and is the most significant complication after intra articular or extra articular injury. Physiotherapy treatment includes cryotherapy, mobilization techniques, muscle energy techniques which are effective in reducing knee stiffness. The aim of this current case report is to improve pain, the knee range of motion (ROM), prevent secondary complication and improve the function. 23 year male provided the combination of manual therapy and isolytic muscle contraction approach to the knee joint. In this case report we used the outcomes like VAS for pain, knee ROM, muscle strength and Lysholm knee scale to evaluate the functional capabilities of the patients to check the improvement in pre and post treatment measurements. The conclusion included that though the post-operative femoral condylar knee stiffness is challenging to manage we can get the positive results by using multimodal physiotherapy program.

**Keywords:** Femoral condylar fracture, Post traumatic knee stiffness, Isolytic contraction.

## 1. INTRODUCTION

Distal femoral fractures represent 3-6% of femoral and 0.4% of all fractures. Distal femoral condylar fractures are commonly associated with the road traffic accident with significant incidence in young and middle aged population (Martinet et al., 2000). The articular malalignment and incongruent fixation of fractured fragments (Bhandakkar et al., 2020) causes associated symptoms including pain, compromised range of motion, and affect the function independency of the knee joint (Khan et al., 2017). Stiffness is observed as a very complex symptom as it involves complexity in terms of pathogenesis as well as treatment (Zade and Deshmukh, 2019) making it a subject of concern for surgeon, physiotherapist and patient. Various definitions for knee stiffness were gathered by Kim et al., (2004) such as a flexion contracture  $>15$  degree and a maximum flexion  $<75$  degree.

Limited knee flexion ROM may alter the gait pattern affecting the ankle, hip, limit functional, squatting, and cause difficulty in stair climbing and

sitting (Telang et al., 2020; Yadav et al., 2020). Therefore, regaining full function of knee is important to ensure patient can perform their daily routines (Risaldar et al., 2020). In this case report the main aim was to focus on multi model approach to reduce pain and increase knee ROM and its function.

## 2. CASE DESCRIPTION

This is a report presenting physiotherapy (PT) management to improve mobility, restore patient's muscle strength and improve Quality of life.

### Patient history

A 23 year old man apparently alright 3 months back, had a road traffic accident. At the time of fall his right leg was dashed from lateral side by motor bike. He was immediately taken to hospital. He was operated for fracture right distal femoral condylar with plate and screws and was discharged from the hospital after a week and was referred to PT department after 3 months. During his first visit to physiotherapy department, his major complaints were: pain on the right knee and stiffness, limited right knee movement, when bending, right knee muscle weakness. He said the pain to be 8/10 on the pain scale (VAS). Pain is more while performing knee bending activities and reduced when he take support to the affected leg. The pain did not alter his sleep and would usually provoke mostly during daytime when bending the knee, example while using toilet. Being a company worker, he had to work 8 hours/ day which mostly involved standing and walking. He was able to drive independently before the operation. At present, he is dependent on his family for mobility in and out.

### Physical examination

Belonging to a normal BMI, he had a moderate built. He came to PT department using a walker with 2 point gait, accompanied by his brother. He appeared well, and cooperative. Palpation revealed slight swelling, muscle wasting, but no tenderness and no structural deformity. For the ROM, a goniometry was used to measure the knee movement. The findings (Table 1) showed that he had limited movement in right knee flexion; While, the left knee was normal, actively and passively.

**Table 1** Goniometry measurements for right knee active and passive at day 1 of assessment.

Right Knee	Active ROM (first day on 1 <sup>st</sup> week)	Passive ROM (first day on 1 <sup>st</sup> week)
Flexion	0-80°	0-85°
Extension	80-0°	85-0°

On accessory movement examination, it was found that the right patellar superior- inferior movements were reduced when compared to the contralateral side. While other accessory movements appeared normal. The Manual Muscle Testing (MMT) with MRC muscle power scale was used to assess muscle strength. Following the operation, the affected leg was immobilized for recovery to occur but the affected muscles went into atrophy due to inactivity, thus leading to muscle weakness and limitation in ROM. The MMT (Table 2) confirmed that he had weakness of right knee muscles (flexors- 3/5, extensors- 3/5). For left knee MMT for both flexors and extensors is 4/5. The Lysholm knee scoring scale consists of 8 sections which include limping, using care or crutches, locking sensation in the knee, giving way sensation from the knee, pain, swelling, climbing stairs, and squatting. In this patient, the total score was 41/100 which suggested it as an unsatisfactory score.

**Table 2** MRC muscle power grades for right and left knee flexors and extensors at 1<sup>st</sup> day of assessment (First day on 1<sup>st</sup> week)

Muscles (MRC)	Right Knee	Left Knee
Hamstring	3	4
Quadriceps	3	4

### Diagnosis

Diagnosis was done on the basis of subjective and objective examination and previous medical records as the case of post-operative (Figure 1) femoral condylar knee stiffness.



**Figure 1** Post-operative X-ray of right knee

#### Treatment Methods

Patient was treated for 4 weeks. The treatment protocol was designed accordingly; patient education, pain relief, increasing mobility and improving strength. In first and second week, cryotherapy for about 20 minutes was used to reduce pain and swelling, we used Continuous Passive Motion (CPM) machine for half an hour daily supervised by senior physiotherapist to improve his mobility. The range was adjusted accordingly and increased gradually by 10 degrees daily within limits of pain. The Maitland mobilization for tibiofemoral joint demonstrating Antero-Posterior (A-P) glides as shown in figure 2(a) for grade 1 and 2 was given three times, and isometrics were started which included static contraction of quadriceps muscle, static contraction of hamstring muscles, and straight leg raise (SLR) was given five times with hold of 10 seconds.



**Figure 2(a)** Maitland mobilization for tibiofemoral



**Figure 2(b)** Isolytic Contraction technique joint A-P glides

In third and fourth week, the patient demonstrated the reduction in pain from Visual analog scale (VAS) 8 to 2. Standard exercises were continued, while progression to Maitland mobilization for tibiofemoral joint with A-P glides within grade 3 and 4 joint were started. Also, patellar mobilization superior-inferior glides within grade 1 and 2 for patella were started. Isolytic contraction technique or muscle energy technique (MET) for 5 times/ day was started as shown in figure 2(b). This treatment protocol was entirely based on improving strength of muscles and joint range of motion. Isometrics were discontinued. Treatment started with isolytic contraction technique and open kinetic chain exercises for improving quadriceps strength that included dynamic contraction of Quadriceps muscle, Vastus medialis oblique (VMO) was strengthening and strength training with weight cuffs and therabands for knee flexors and extensors.

### Outcome

Pain was reduced to 2 on pain scale (VAS). Swelling over the knee joint was reduced. Tightness over the Hamstring was reduced by isolytic contraction. Knee joint mobility was improved as shown in table 3 and strength of the major muscles of knee joint was improved as shown in table 4. According to Lysholm knee scale, his score was 84 which is a good.

**Table 3** Post treatment Goniometry measurements for right knee active and passive at last day of treatment.

Right Knee	Active ROM (last day of 4 <sup>th</sup> week)	Passive ROM (last day of 4 <sup>th</sup> week)
Flexion	0-120°	0-130°
Extension	120-0°	130-0°

**Table 4** MRC muscle power grades for right and left knee flexors and extensors at last day of treatment.

Muscles (MRC)	Right Knee	Left Knee
Hamstring	4	4
Quadriceps	4	4

## 3. DISCUSSION

According to Saini et al., (2018), fixation of the fracture using a DF-LCP (Distal femoral- Locking Compression Plate) has shown excellent to satisfactory results in majority of both extra articular and intraarticular fracture. According to Hoffman et al., (2013), despite these modern fixation techniques of locked plating, distal femoral fractures often still result in poor clinical outcome. Hasubhai et al., (2017), concluded that Continuous Passive Motion (CPM) enhances early knee motion and improves functionality in Total knee arthroplasty along with Conventional physiotherapy. Therefore, we have incorporated CPM in our early phase of rehab which showed significant results in terms of increasing ROM. We have incorporated dynamic contraction of Quadriceps muscle and Vastus Medialis Oblique (VMO) strengthening. Many studies were done on open and closed kinetic chain exercises. According to Cheon et al., (2020), rehabilitation with open kinetic chain exercise improved the thickness of Vastus Intermedialis muscle and closed kinetic chain exercises improved the thickness of Vastus medialis oblique.

Many studies were done on effects of SLR with rotations on Quadriceps muscle weakness. According to Mikaili et al., (2018), SLR exercise with hip external rotation with the simultaneous contraction of ankle dorsiflexors in subjects with quadriceps muscle weakness. Therefore we have used SLR exercise with hip external rotation. In isolytic contraction, the patients are asked to perform the movement and the therapist resists the movement along with stretching and contracting the associated group of muscles. According to Kamble et al., (2020), short term effect of isolytic contraction in hamstring flexibility in asymptomatic subjects with hamstring tightness has proven to be significantly effective. Therefore, we are using isolytic contraction in our case. Postoperative pain interferes with persistent passive movement that is critical for the rehabilitation of the knee, post-operative pain management is very important. According to Adie et al., (2010), application of structured cryotherapy was effective in reducing pain, relieving inflammation, reducing oedema, and increasing range of motion in patients with TKA compared to conventional physiotherapy. Therefore, we are using cryotherapy for the reducing pain.

## 4. CONCLUSION

The main aim for PT following post-operative condylar fracture stiffness is to restore mobility and strength so that patient can return to his daily routine as early as possible without any pain and discomfort. This patient within four weeks of multimodal physiotherapy treatment has shown significant progression in terms of pain, knee ROM, and functional movement.

**Author's Contribution**

All authors contributed equally to the manuscript.

**Conflict of Interest**

The authors declare no conflict of interest.

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**Informed Consent**

Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

**Data and materials availability**

All data associated with this study are present in the paper.

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